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10/809,297	03/25/2004	Kiyoshi Chikamatsu	40020852-02	1500

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EXAMINER
WEST, JEFFREY R

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>29 May 2007</u>.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1,3,6 and 8</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1,3,6 and 8</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>26 May 2006</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

       1.☒ Certified copies of the priority documents have been received.

       2.☐ Certified copies of the priority documents have been received in Application No. _____.

       3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,808,463 to Nagano.

With respect to claim 1, Nagano discloses a vector-detecting apparatus that detects the in-phase component and the quadrature-phase component of a pre-determined frequency signal, said apparatus comprising a frequency converter/mixer for converting said pre-determined frequency signal to a signal under test (column 5, lines 6-12), a first digital filter, and a second digital filter (column 6, line 34), wherein said first and second filters filter the output signal of said frequency converter and whose impulse responses are orthogonal to each other (column 5, lines 30-34), and wherein the output of said first filter is regarded as the in-phase component of said signal under test, and the output of said second filter is regarded as the quadrature-phase component of said signal under test (column 5, lines 34-38) and wherein said first filter and said second filter are digital filters (column 5, lines 33-35).

Nagano also discloses that the response of said first filter is weighted by the sine function of the same frequency as said signal under test after frequency conversion by said frequency converter, and the impulse response of said second filter is

weighted by the cosine function of the same frequency of the same signal under test

after frequency conversion by the frequency converter, wherein the first and second

filters are single filters (column 5, lines 53-64).

Nagano further discloses that the ratio of the frequency of said pre-determined

frequency signal and said signal under test is higher than 3 (column 5, lines 22-29

and column 8, lines 17-32) and, since it is considered to be inherent that in the mixer

configuration of Figure 3 that the frequency of the local signal inputted into the mixer

has a frequency in the range of the pre-determined frequency signal in order to

obtain the desired low frequency of the signal under test, Nagano further discloses

that a ratio of the frequency of a local signal inputted into said frequency converter

and said signal under test is also higher than 3 (Figure 3, column 5, lines 22-29 and

column 8, lines 17-32).

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

4.   Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over

Nagano in view of U.S. Patent No. 5,856,796 to Akune et al.

As noted above, the invention of Nagano teaches many of the features of the

claimed invention and while the invention of Nagano does teach that the ratio of the

frequency of said pre-determined frequency signal and said signal under test is

higher than 3 (column 5, lines 22-29 and column 8, lines 17-32) and, since it is

considered to be inherent that in the mixer configuration of Figure 3 that the

frequency of the local signal inputted into the mixer has a frequency in the range of

the pre-determined frequency signal in order to obtain the desired low frequency of

the signal under test, Nagano further teaches that a ratio of the frequency of a local

signal inputted into said frequency converter and said signal under test is also higher

than 3 (Figure 3, column 5, lines 22-29 and column 8, lines 17-32), Nagano does not

explicitly indicate that the ratios are integers.

Akune teaches a sampling rate converting method and apparatus for performing

frequency conversion (column 2, lines 25-37) wherein the frequency conversion is

performed to obtain signals that are integer ratios of each other (column 3, lines 14-

33).

It would have been obvious to one having ordinary skill in the art to modify the

invention of Nagano to explicitly indicate that the ratios are integers, as taught by

Akune, because, as suggested by Akune, the combination would have improved the

system of Nagano by performing the frequency conversion using integer ratios to

obtain the intermediate frequency signal thereby simplifying the process for

obtaining the intermediate frequency as well as further processing by eliminating the

production of jitter (column 2, lines 25-37).

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over

Nagano in view of U.S. Patent No. 4,888,701 to Wakasugi et al.

As noted above, the invention of Nagano teaches all of the features of the claimed invention except for explicitly stating that the apparatus of Nagano is used as part of an impedance measuring apparatus.

Wakasugi teaches an apparatus for measuring a vector voltage ratio including a plurality of phase detectors connected to a plurality of A/D converters (column 3, lines 2-6) for detecting in-phase and quadrature-phase vectors (i.e. vectors with phase components 90 degrees from each other) (column 3, lines 29-37) for use in measuring impedance (column 4, lines 16-30).

It would have been obvious to one having ordinary skill in the art to modify the invention of Nagano to explicitly state that the apparatus of Nagano is used as part of an impedance measuring apparatus because the invention of Wakasugi suggests that impedance measuring apparatuses require accurate measurements of in-phase and quadrature-components (column 1, lines 6-25) and therefore the combination would have provided a wider variety of applications of the invention of Nagano by applying the in-phase and quadrature phase detection means to an impedance measuring apparatus.

Further, the limitation specifying the use of the apparatus of Nagano as part of an impedance measuring apparatus is considered to be a recitation of intended use. It has been held that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art

structure is capable of performing the intended use, then it meets the claim. In this case, since the structure of Nagano could be used in any of a plurality of apparatuses, including an impedance measuring apparatus, it meets the claim.

Further still, Applicant admits as Prior Art in the Background of the Invention that it is well-known in the art to use in-phase and quadrature detection in impedance measuring devices. Therefore, it would have been obvious to one having ordinary skill in the art to conform to what is common in the art by applying the method of Nagano to a conventional impedance measuring apparatus. *When applicant states that something is prior art, it is taken as being available as prior art against the claims. Admitted prior art can be used in obviousness rejections. In re Nomiya, 509 F.2d 566, 184 USPQ 607, 610 (CCPA 1975).*

6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nagano in view of Akune and further in view of U.S. Patent No. 4,888,701 to Wakasugi et al.

As noted above, the invention of Nagano and Akune teaches all of the features of the claimed invention except for explicitly stating that the apparatus of Nagano and Akune is used as part of an impedance measuring apparatus.

Wakasugi teaches an apparatus for measuring a vector voltage ratio including a plurality of phase detectors connected to a plurality of A/D converters (column 3, lines 2-6) for detecting in-phase and quadrature-phase vectors (i.e. vectors with

phase components 90 degrees from each other) (column 3, lines 29-37) for use in measuring impedance (column 4, lines 16-30).

It would have been obvious to one having ordinary skill in the art to modify the invention of Nagano and Akune to explicitly state that the apparatus of Nagano and Akune is used as part of an impedance measuring apparatus because the invention of Wakasugi suggests that impedance measuring apparatuses require accurate measurements of in-phase and quadrature-components (column 1, lines 6-25) and therefore the combination would have provided a wider variety of applications of the invention of Nagano and Akune by applying the in-phase and quadrature phase detection means to an impedance measuring apparatus.

Further, the limitation specifying the use of the apparatus of Nagano and Akune as part of an impedance measuring apparatus is considered to be a recitation of intended use. It has been held that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In this case, since the structure of Nagano and Akune could be used in any of a plurality of apparatuses, including an impedance measuring apparatus, it meets the claim.

Further still, Applicant admits as Prior Art in the Background of the Invention that it is well-known in the art to use in-phase and quadrature detection in impedance measuring devices. Therefore, it would have been obvious to one having ordinary

skill in the art to conform to what is common in the art by applying the method of

Nagano and Akune to a conventional impedance measuring apparatus. *When*

applicant states that something is prior art, it is taken as being available as prior art

against the claims. Admitted prior art can be used in obviousness rejections. In re

Nomiya, 509 F.2d 566, 184 USPQ 607, 610 (CCPA 1975).

Response to Arguments

7. Applicant's arguments filed May 29, 2007, have been fully considered but they

are not persuasive.

Applicant argues:

> The Office Action states that Nagano discloses "...wherein said first and
> second filters filter the output signal of said frequency converter," and so appears
> to equate Nagano's filters 405 and 406 (see Fig. 4, and description at col. 5, lines
> 33 - 39 and 62 - 64) with the present application's first filter 860 and second filter
> 865. Also, the Office Action states that "the response of said first filter is weighted
> by a sine function" and "the impulse response of said second filter is weighted by
> the cosine function" (Office Action at bottom of page 2 and top of page 3). The
> "impulse response" of a filter, as used in the application, is the output from the
> filter when presented with a brief signal, i.e., an impulse.
> However, Nagano clearly discloses digital filters 405 and 406 that have
> weighted signals to filters 405 and 406. Nagano's filters 405 and 406 do not have
> impulse responses that are weighted by a sine function or a cosine function,
> respectively, of the same frequency of the same signal under test.

The Examiner agrees that an "impulse response" of a filter is the output from a

filter when presented with an impulse. The Examiner asserts, however, that an

impulse response of a filter does not mean that the filter is currently receiving an

impulse as an input, but rather since an impulse is a signal having an amplitude,

usually of 1, at time 0 and having an amplitude of 0 at any other time, the impulse

response of a filter is an easy way to characterize the filter. In the instant disclosure and in the invention of Nagano, the inputs of the filter are not an impulse, but in both cases if an impulse were received as an input, the filters would produce an input response. Since Nagano discloses that the input of the filters 405 and 406 are weighted by since and cosine functions, respectively, Nagano discloses that the input responses of the filters are weighted by sine and cosine functions, respectively, specifically:

> Within the quadrature detector 400, signal generators 402 and 404 and multipliers 401 and 403 are provided. The generators 402 and 404 generate digital values of a cosine signal and a sine signal every sampling, respectively, the cosine and sine signals having a same frequency fH. The multipliers 401 and 403 multiply the cosine signal and the sine signal with the digital signal 211 supplied to the quadrature detector 400, respectively. An output signal 212 of the multiplier 401 indicates the in-phase component and is input to the low-pass filter 405. An output signal 213 of the multiplier 403 indicates the quadrature component and is input to the low-pass filter 406. (column 5, lines 53-64)

The Examiner also asserts that, as shown in Figure 4, the same input signal 211 is applied to both filters 405 and 406 via sine and cosine weighting functions operating at the same frequency fH and therefore both filters have impulse responses that are weighted by a sine function or a cosine function, respectively, of the same frequency of the same signal under test.

> Applicant argues:

> Moreover, Nagano fails to disclose or suggest that the first filter is a single filter having an impulse response weighted by a sine function of the frequency of the pre-determined frequency signal and a second filter that is a single filter

having an impulse response weighted by a cosine function of the frequency of
the pre-determined frequency signal. Instead, Nagano requires signal generators
402 and 404 and multipliers 401 and 403 (col. 5, lines 53-54, 57-60).

Therefore, filters 405 and 406 disclosed in Nagano are not the same filters as
the first filter and second filters recited in claim 1, either in terms of operation or
function.

The Examiner asserts that, as seen in Figure 4 of Nagano, the filters 405 and

406 would be understood by one having ordinary skill in the art to be "single filters"

regardless of any other components of the circuit.

Applicant argues:

Applicant submits that Nagano does not disclose or suggest the particular
ratio conditions recited in claim 3. Such ratio conditions are important to the
operation of an apparatus where the first filter and the second filter operate by
filtering an output signal from the mixer.

The first filter and the second filter in the application have a comb-shaped
frequency response, because the first filter and second filter have sine-weighted
and cosine-weighted impulse responses, respectively. If the ratio condition
recited in claim 3 is satisfied, then undesired signals are located around the
"dips" of the comb, as shown in figures 5 and 6 of the application. Thus, pass-
bandwidth of anti-alias filter 830 can be set much wider than in the cited art. On
the other hand, Nagano uses decimation filters for rate-conversion of over-
sampled signals, in order not to output "spurious" signals. Even if the decimation
filters are poor, the aliasing spurious information included in the output signals
from the decimation filters does not match to undesired signals that are output
from the mixer. The integer ratio of decimation is only for producing digital signals
at the required rate.

The Examiner asserts that the limitations of claim 3 only require "a ratio of the

frequency of said pre-determined frequency signal and said signal under test is an

integer of 2 or higher" and "a ratio of the frequency of a local signal inputted into said

mixer and said signal under test is an integer of 3 or higher." These limitations to not

specify any purpose to the ratios and does not specify that the pass-band of a filter

can be set to a certain width. Therefore, Applicant's arguments with respect to the

purpose of setting the ratios is not persuasive.

Applicant argues:

Nagano merely provides that "[i]n the present embodiment, the transmitting
channel may be present in any of frequency regions. However, it will be most
typical in several ten MHz to several ten GHz" and "fH = flp/4" (Col. 5, lines 22-24
and col. 8, line 19), where fH is defined as the cosine and sine signals having the
same frequency (col. 5, lines 56-57) and tip is defined as a frequency that is the
same as the sampling frequency (col. 81 lines 13-14). Nagano does not disclose
or suggest a ratio of the frequency of the pre-determined frequency signal and
the signal under test that is an integer of 2 or higher, let alone a ratio of the
frequency of a local signal inputted into the frequency converter and the signal
under test that is an integer of 3 or higher.
Nagano's disclosure does not even suggest the integer ratios of claim 3,
without recognizing the comb-shaped response of the first filter and the second
filter as well as the spectrum of signals from the mixer. Akune does not
supplement the deficiency in Nagano to provide for the integer ratios recited in
claim 3, nor would it have been obvious for the skilled practitioner, without benefit
of hindsight, to have picked out an integer ratio from the secondary reference
and combine it with Nagano so as to arrive at the features of claim 3.

The Examiner first asserts that the invention of Akune is only included to

explicitly indicate that the ratios are integers. The invention of Nagano already

discloses the required relationships between the frequency of the pre-determined

frequency signal and said signal under test and the frequency of a local signal

inputted into the frequency converter/mixer and the signal under test.

Akune also provides motivation that it would have been obvious to one having

ordinary skill in the art to modify the invention of Nagano to explicitly indicate that the

ratios are integers because the combination would have improved the system of

Nagano by performing the frequency conversion using integer ratios to obtain the

intermediate frequency signal thereby simplifying the process for obtaining the

intermediate frequency as well as further processing by eliminating the production of

jitter, specifically:

> In one aspect, the present invention provides a method for converting the
> sampling rate of a one-bit data signal obtained by $\Sigma\Delta$ modulation into a 24-bit
> signal at 32 kHz, 48 kHz, 96 kHz, or 192 kHz, without producing any jitter by
> decimating in a decimation filter the 2.8224 MHZ sampling frequency of the 1-bit
> digital signal by a selected decimation factor and then oversampling the output of
> the decimation filter in a quintuple interpolation filter to arrive at one of the above
> output sampling frequencies.
> By constructing additional stages and selecting the decimation factors, all of
> the sampling frequencies can be produced using integer ratios, thereby
> precluding the production of jitter during the sampling frequency conversion
> (column 2, lines 25-37).

With respect to the relationships of Nagano, the Examiner asserts that Nagano

discloses, in column 5, lines 22-29, that the predetermined frequency signal is in the

range of several ten MHz and the signal under test is about 220 kHz. Turning to

Figure 3, the predetermined frequency signal corresponds to the signal being output

from the DUT and the signal under test corresponds to f_{IF}. One having ordinary skill

in the art would recognize that the ratio of 10 MHz, for example, to 220 kHz is

greater than 2.

The frequency converter/mixer of Nagano corresponds to "8" in Figure 3 and

receives a signal f_{LO} (local signal) in order to convert the 10 MHz predetermined

frequency signal to the 220 kHz signal under test. Given the well known operation of

a mixer, f_{IF} corresponds to the either the sum or difference of the predetermined

frequency signal and the local signal. Obviously, f_{IF} cannot correspond to the sum of the predetermined frequency signal and local signal, so it must correspond to the difference. One having ordinary skill in the art would recognize that in order for the mixer to reduce the frequency of the predetermined frequency signal from 10 MHz to the frequency of the signal under test of 220 kHz, the frequency of the local signal inputted into the mixer must have a frequency in the range of the predetermined frequency and therefore a ratio of the frequency of a local signal inputted into said frequency converter and the signal under test is also higher than 3.

Conclusion

8.   The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure.

U.S. Patent Application Publication No. 2004/0070766 to Szafraniec teaches a method and apparatus for a Jones Vector based heterodyne optical polarimeter including the use of two orthogonal filters to determined in-phase and quadrature components.

U.S. Patent No. 6,724,832 to Hershberger teaches a vestigial sideband generator including two low-pass filters for producing folded orthogonal base-band components of I (i.e. in-phase) and Q (i.e. quadrature).

U.S. Patent No. 6,704,324 to Holmquist teaches an apparatus and method for transmission of voice band signals over a DSL line including determining in-phase and quadrature components in accordance with orthogonal Hilbert pass-band filters.

U.S. Patent No. 6,928,060 to Kikuchi teaches audio data communication employing frequency conversion defined by an integer ratio.

ATIS, "Mixer" defines a mixer as a device "that accepts as its input two different frequencies (signals) and presents at its output...(b) a signal equal in frequency to the difference between the frequencies of the inputs signals".

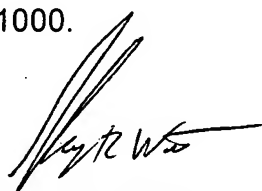9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey R. West whose telephone number is (571)272-2226. The examiner can normally be reached on Monday through Friday, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Eliseo Ramos-Feliciano can be reached on (571)272-7925. The fax

phone number for the organization where this application or proceeding is assigned

is 571-273-8300.

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assistance from a USPTO Customer Service Representative or access to the

automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-

272-1000.

Jeffrey R. West
Primary Examiner
Art Unit – 2857

August 19, 2007